

Josiane Meier

Designating Dark Sky Areas: Actors and Interests

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Designating Dark Sky Areas: Actors and Interests²

1 Introduction

The rapid increase in artificial outdoor lighting has led to a widespread loss of areas with naturally dark nights in many regions of the world. With problematic effects of artificially illuminated nights – widely termed as light pollution – becoming ever-more apparent and increasingly recognised (see e.g. Morgan-Taylor 2015), efforts to define and safeguard areas in which nights are still fairly dark have gained momentum in recent years.

The designation of “dark sky areas” is currently the policy instrument most widely applied to this purpose. National and international organisations such as the Royal Astronomical Society of Canada (RASC) and the International Dark-Sky Association (IDA) promote and offer various options for dark sky certification that are increasingly sought after. A central prerequisite for such certification is the implementation of public policies, underpinned by broad political and public support, to protect the quality of the night sky by minimising light pollution, in consequence demanding substantial multi-stakeholder efforts.

The analysis presented here takes a first step toward better understanding these efforts and thereby contributes to the inquiry of the emerging lighting governance framework that Aubrecht et al. called for in 2010. It strives to identify which actors are involved in the work towards dark sky designation at local and regional level, which positions these actors have toward the designation and which interests shape these positions. The research builds on case studies centred on semi-structured interviews, which were informed and complemented by reviews of primary and secondary literature, participant observation, policy document analysis and a screening of media reports.

In taking this empiric approach, this contribution furthers and complements a body of literature that has, so far, been advanced mostly by thematic conferences at the junction between research, policy and practice and their proceedings. Examples include the “Ecology of the Night” symposium in 2003, with contributions on the Canadian and US park administrations’ outlooks on mitigating light pollution (Welch, 2003; Moore, 2003), the “International Starlight Conferences” held in 2007, 2009 and 2012 with contributions on regional efforts toward and regulatory aspects of dark sky protection (e.g. Gyarmathy, Kolláth, & Pintér, 2007; Legris, 2007; Wuchterl, 2009;

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Hearnshaw, 2013; Welch, 2013) and, similarly, the annual “European Symposia for the Protection of the Night Sky” and “International Symposia for Dark-sky Parks”.³

The contribution sets out with an overview of current designated areas and options for certification. Using examples of dark sky areas in Canada, Germany and the United States, it then examines the actors involved at local and regional level and the range of interests at play in the pursuit of dark sky designations. Finally, it seeks to identify how these actors and interests compete or align when it comes to protecting areas from the impacts of artificial lighting.

2 Designated Areas Around the World and their Proponents

Dark sky areas can be defined as delimited areas remote from urban centres with low levels of light pollution, for which policies have specifically been put in place to protect and preserve their natural darkness for the general public. Their number has increased quite rapidly in recent history: 50 of the 55 areas analysed for this study were designated in the ten years since 2004⁴. The great majority of these designations (45 in total) came into place in the years since 2008, which highlights the relative novelty as well as the recent dynamic of this policy movement.

The majority of all designated areas are, thus far, located in North America, where the movement has its origins (see image 1). More recent years have seen increased designations in Europe, where over one third of the areas are to be found, as well as individual designations in Africa, Oceania and South America. Overall, dark sky designation can currently clearly be described as a phenomenon of western industrialised countries.

In most cases, dark sky areas overlap with areas that are already under some form of environmental protection. Reasons for this include that environmentally protected areas are often remote and thus less affected by urban lighting (though light is clearly encroaching – see Aubrecht, Jaiteh, & de Sherbinin, 2010); that protection from light pollution can be added on to an existing set of conservation regulations; that there is a single managerial body to coordinate the endeavour; and that the largest designation schemes in part require that the land is previously protected (see below).

³ Dark sky areas also play a prominent role in the Journal of the RASC’s Special Report on the “Environmental Impact of Light Pollution and its Abatement”, which contains contributions on approaches to and experiences with the protection of dark sky areas as well as an overview of designated areas (Dick & Welch, 2012a, 2012b; Giguère, 2012).

⁴ Some dark sky areas have received more than one designation. These numbers reflect the year the first designation was put in place. They do not include protected zones established around observatories, unless they have been explicitly designated as publicly accessible dark sky areas, or designations in urban areas. The statistics are based on information compiled by the IUCN Dark Skies Advisory Group (2014) and the Starlight Initiative (n.d.) as well as own research and cover the time up to May 2014.

There is a range of actors that designate dark sky areas. These include national and international non-governmental organisations and foundations as well as local, regional and state-level governments and institutions. Similarly, there is a variety of types of designation. These include certification schemes that allow actors to apply for an area to be designated, thereby typically granting the right to carry a label, as well as legislative procedures that lead to declaration as a dark sky area, commonly through a political decision.

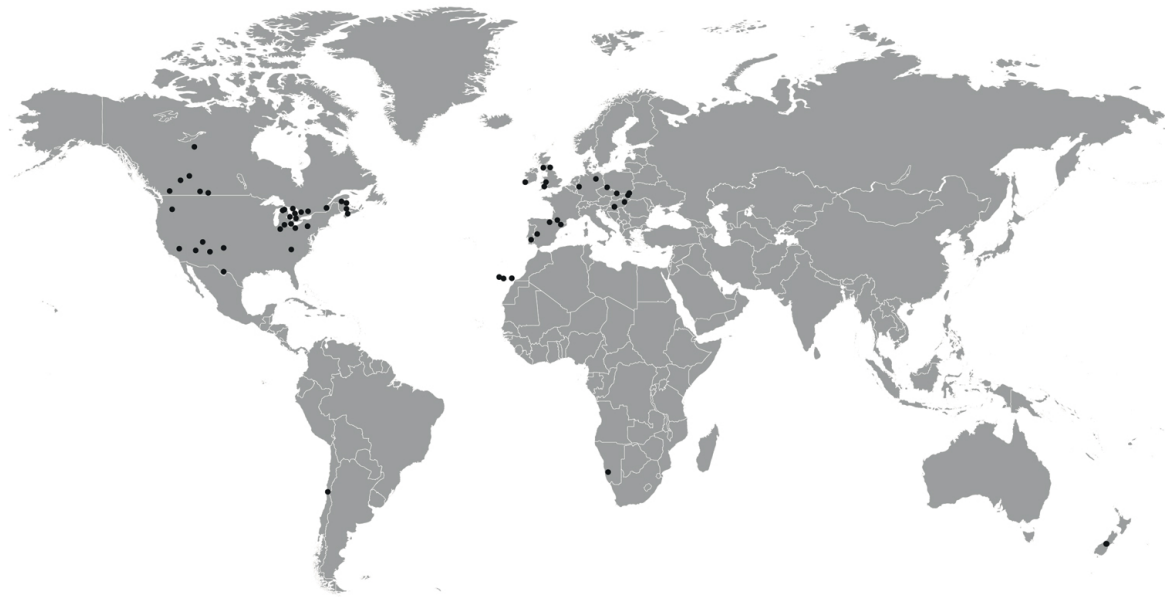


Image 1: Locations of dark sky areas around the world; source: own illustration

Among the actors that designate dark sky areas, the two most prominent by number of designations are currently the IDA and the RASC: taken together, they account for roughly 70% of designations. While the IDA designates internationally, the RASC has, so far, only designated areas in Canada. In 2007, the Starlight Foundation was established as an additional international designating organisation. All three of these organisations are rooted in or have close links to astronomy and designate dark sky areas in the sense of certifying them according to set criteria, allowing them to carry a label if designation is granted.

The IDA and the RASC employ three different designation schemes (see table 1): International Dark Sky Parks, International Dark Sky Reserves (both IDA) and Dark-Sky Preserves (RASC). One substantial difference between the schemes is that Reserves and Preserves feature a dual-zone concept – there is an inner core zone and an outer buffer zone which can include municipalities – whereas parks rely on a single-zone concept. Linked to this, demands toward the type of land to be designated vary: While Parks should be in public hands, Preserves and Reserves can include private land; additionally, the designated land should be completely (Parks) or partially (Reserves) under environmental protection. Beyond these

differences, the three designation schemes share a number of essential requirements – though there are nuanced differences between these, their general orientation aligns quite closely. Aside from demands toward night sky quality⁵, these include the provision of public night-time access to all or part of the area and of education or outreach programming aimed at the general public and municipalities. At policy level, the adoption of lighting guidelines to minimise lighting and light pollution in the area is required⁶, as is the compilation of a lighting inventory and the specification of compliance plans for changes to lighting that does not yet meet demands (IDA, 2013a, 2013b; RASC & Dick, 2011; Dick, 2013).

Parameters and basic concept			
Designation	Dark-Sky Preserves	Dark Sky Parks	Dark Sky Reserves
Designating organisation	RASC	IDA	IDA
First designation	1999	2006	2008
Designations as per April 2014	15	16	8
Zone concept	Dual-zone	Single-zone	Dual-zone
Type of land	Public or private land with a single managing authority	Protected public land	Public or private land, core must be protected
Key requirements			
Key general requirements		Key policy requirements	
✓ Minimum night sky quality		✓ Adoption of lighting guidelines	
✓ Night-time accessibility		✓ Compilation of a lighting inventory	
✓ Education and outreach programming		✓ Compliance plans for lighting that does not meet the guidelines' demands	

Table 1: Largest designation schemes – main characteristics⁷; source: own illustration

⁵ The level of night sky quality is determined through readings using a technical device (Unihedron Sky Quality Meter – SQM) or applying comparative methods relying on the human eye (esp. the Bortle Scale). The RASC directly adds a SQM reading to the designation title; in order to be granted designation, an area's night sky quality must be considered sufficient by a local astronomy group (RASC & Dick, 2011, p. 4). The IDA has three defined tiers – gold, silver and bronze – that each correspond to a range of levels of darkness; in order to be granted designation, an area must at least meet bronze-tier night sky quality requirements (IDA, 2013a, pp. 3–7, 2013b, pp. 3–6).

⁶ In the case of Dark Sky Reserves, adequate guidelines must be adopted by municipalities to a proportion corresponding to at least 80% of the population and 80% of the area of protection within the entire Reserve. These “should address all private and public owners of communities within the area of protection”, though exceptions may apply (IDA, 2013a, p. 3). In the case of Dark-Sky Preserves, the guidelines should apply to the entire area. However, there is the option of isolating larger towns by surrounding them with a buffer zone (Dick, 2013).

⁷ There is some flexibility to both designation schemes. While the IDA stipulates where exceptions to requirements may be possible, the RASC states generally that it may “... waive or amend any of these guidelines for a specific application provided that the integrity of the DSP programme is not jeopardized” (RASC & Dick, 2011, p. 4).

3 Introducing the Case Studies

The analysis of actors and their interests is based on three case studies, which were chosen such as to ensure that a variety of ages of designation, of designation schemes and designating organisations, as well as of states and types of protected areas⁸ is represented. In short, the case studies can be characterised as follows:

Year of designation	Designation scheme	Designating organisation	Type of protected area	Size in km ²
The Torrance Barrens, Ontario, Canada				
<i>One of the oldest known designated dark sky areas</i>				
1999	Dark-Sky Preserve	RASC	Uninhabited, no facilities IUCN category II	19
The Headlands, Michigan, USA				
<i>A dark sky area recently designated under the leading designating organisation's largest program</i>				
2011	Dark Sky Park	IDA	Largely temporarily inhabited, basic facilities IUCN category unassigned	2,4
The Westhavelland, Brandenburg, Germany				
<i>A recently designated triple-zone dark sky area that includes several municipalities</i>				
2014	Dark Sky Reserve	IDA	Incorporating towns in 2 zones surrounding a core IUCN category V	Core: 38,6 Inner buffer: 748

Table 2: Case studies: overview and main characteristics; source: own illustration

The following descriptions of the case studies outline information on selected framework conditions, including the type of protected area and related aims, and provide a brief summary of the process leading up to dark sky designation.

3.1 Torrance Barrens, Ontario, Canada

The Torrance Barrens is a RASC Dark-Sky Preserve located within the District Municipality of Muskoka in Southern Ontario, Canada, at a distance of approximately 5 km from the small village of Torrance to the Northwest, and ca. 10 km from the town of Gravenhurst with its 12.000 inhabitants to the Southeast. The city of Toronto is at a distance of roughly 190 km to the South. The Muskoka area is known as “cottage country” – it is a destination for outdoor recreation and leisure activities –

⁸ Where possible, International Union for Conservation of Nature (IUCN) categories are named for ease of comparison. For an overview of the categories, see (Dudley, 2008, pp. vii, x, 13ff).

and the tourism industry constitutes Muskoka's main economic base (District Municipality of Muskoka, 2011, p. 20).

The 19 km² Torrance Barrens was designated a conservation reserve by the Ontario Ministry of Natural Resources (MNR) in 1997, after having been identified as worthy of protection by local individuals and governments for its natural, recreational and aesthetic value. Conservation reserves are designed "to protect natural heritage areas and natural features on public land, while preserving traditional public land uses" (Gray et al., 2012, p. 169). The Torrance Barrens abuts other protected areas, making it part of a local system of parks. The reserve is characterised by bedrock barrens and wetlands with some wooded areas. It is completely uninhabited, but features several hiking trails, and a main snowmobile trail runs through the reserve (Ontario Ministry of Natural Resources, 2006; Shaver, 2003; Silver, n.d.).

As Crown land, the Torrance Barrens is owned by the province of Ontario and operated by the Parry Sound District of the Ontario MNR. Administratively, it lies in the Township of Muskoka Lakes and the Town of Gravenhurst. Though the property is contiguous, it encloses a parcel of land owned and protected by a private regional land trust, which is, however, equally accessible to the public (interview 1). As is the case for all conservation reserves, the MNR's operation of the Torrance Barrens is governed by a "Statement of Conservation Interest" that is specific to the site and details the Ministry's intents for its development (Shaver, 2003, p. 1).

It is through this Statement of Conservation Interest that the Torrance Barrens was designated a "Dark Sky Reserve" by the MNR in 1999, which stipulates that if the installation of any lighting is considered in the future, "the MNR will not allow unnecessary, undirected light pollution" (Ontario Ministry of Natural Resources, 2006, p. 13). The designation was the result of a bottom-up initiative which fed into the consultation process for the drafting of the Statement. It was begun by a cottager one year prior and quickly garnered the support of individuals, interest groups and the two town councils. The designation of the world's first permanent Dark Sky Reserve was publicly announced at the RASC's 1999 annual meeting. Soon thereafter, the RASC itself recognised the Torrance Barrens as the first of what would become a series of RASC dark sky areas in Canada (interview 2; interview 3; Muskoka Heritage Foundation, 2013; Shaver, 2003).

3.2 The Headlands, Michigan, USA

The Headlands is a silver-tier Dark Sky Park located along the Straits of Mackinac on the Northern tip of the State of Michigan's Lower Peninsula in the United States of America, approximately 3,2 km from Mackinaw City with its ca. 800 inhabitants. The surrounding region is known as a resort community, and tourism has been the county's primary industry since its founding in 1853 (Emmet County, 2009, p. 53, 2013, pp. 5–8).

The Headlands covers an area of approximately 2,4 km² and was designated a county park by Emmet County in 1996 (Emmet County, 2011, p. 23). As a county park, the Headlands is classified as a Natural Resource Area, meaning that the land has been “set aside for preservation of significant natural resources, open space, and visual aesthetics/buffering” (Emmet County, 2013, p. 20). The park is largely wooded and has a trail system that caters to visitors such as hikers, cyclists, and cross-country skiers. Of the three buildings in the Headlands at the time of designation, only the caretaker’s residence was permanently inhabited. The two guesthouses were available for rent by the public and could accommodate up to 40 people in total⁹ (Emmet County, 2012, 2013, p. 31).

The Headlands property is owned and operated by Emmet County. However, a private land trust holds a conservation easement to prevent excessive development and assure that the Headlands remain available for public recreation (Little Traverse Conservancy, 1996). The park is governed by the Emmet County Parks and Recreation Committee, which consists of members of the County Board of Commissioners (the county’s governing body) as well as county citizens (Emmet County, 2013, p. 18).

Work towards dark sky designation began in 2009, the International Year of Astronomy, when the County Board of Commissioners signalled support of a proposal developed by a local star lore historian together with an employee of the county’s communications department and the director of the Outdoor Lighting Forum¹⁰ (Emmet County, 2011, p. 42f; interview 4). With a unanimously passed resolution, the Board of Commissioners adopted a Dark-Sky Park Policy as well as an amendment to the County Park Rules Ordinance, and designated the Headlands as the county’s first Dark-Sky Park in 2010 (Emmet County Board of Commissioners, 2010; Emmet County, 2010). In May 2011, designation was awarded to the Headlands by the IDA. Remarkably, the dark sky area was expanded considerably little over a year later, when a large tract of state- and county-owned land was designated a Dark Sky Preserve under a pre-existing Michigan law, thereby creating a contiguous “Dark Sky Coast” of over 90 km² (interview 5; Emmet County, 2013, p. 34).

3.3 Westhavelland in Brandenburg, Germany

The nature park (Naturpark) Westhavelland is a silver-tier Dark Sky Reserve, located in the federal state of Brandenburg, Germany, about 70 km west of Berlin. The 1.315 km² park incorporates a total of 78 municipalities and 75.305 inhabitants. Roughly

⁹ One of the two guesthouses has meanwhile been removed; plans for establishing a larger facility are under consideration (Bentley, 2014).

¹⁰ The Outdoor Lighting Forum is a volunteers’ organisation working for the reduction of light pollution in the region.

half of the population lives in Rathenow and Premnitz, two larger municipalities in the south-western part of the park, while the other half is disbursed across small villages (MUGV Brandenburg, 2010). The overall region has been faced with considerable population and commercial decline since German reunification in 1990. While there is some industry in Rathenow and Premnitz, agriculture and tourism (albeit at a fairly low level) are the main sectors of employment in the Westhavelland's extensive rural areas (MUGV Brandenburg, 2007; interview 6).

German nature parks aim to combine the protection of a high level of habitat and species diversity with environmentally responsible agriculture, sustainable tourism and land use (Bundesamt für Naturschutz, 2012). As such, the Westhavelland is a large-scale cultural landscape that is predominantly composed of landscape protection areas (77% of the total area, IUCN category V) and nature reserves (20% of the total area, IUCN category IV), and roughly 70% of the land is in private hands. Established as a nature park in 1998, the Westhavelland's landscape is characterised by numerous bodies of water, broad lowlands and wooded uplands (Hänel, Hesse, & Isermann, 2013, p. 26; MUGV Brandenburg, 2010).

The park's administration is subordinate to the state's Ministry of Environment, Health and Consumer Protection. It is tasked with supporting the region's sustainable development by preserving its natural resources, promoting environmental education, mobilising the park's economic potential and mitigating conflicts, which occur primarily between environmental protection and agricultural use (interview 7; MUGV Brandenburg, 2011). A board of trustees, composed of stakeholders from various administrative levels and regional interest organisations, acts as a broker of interests between the park administration, municipalities and other regional authorities and organisations. The municipalities in the nature park enjoy a high level of decision-making autonomy, including the right to shape their own lighting and thus the main source of artificial illumination in the Westhavelland.

The first step toward establishing a dark sky area was taken in early 2010, when the park's board of trustees unanimously supported the idea of applying for designation. The suggestion had been put forward by the head of the dark sky section of the German amateur astronomers' organisation and was supported by the park administration. Four unlit and unpopulated areas (122 km² in total) in the north-westerly part of the park were proposed to the IDA for designation as a Dark Sky Park in late 2011, following the approval of the initiative and of the proposed lighting guidelines by the councils of 17 nearby towns¹¹. The concept foresaw that the four areas would eventually be combined and expanded to one larger area, including 16

¹¹ With one exception, all councils addressed voted in favour of the initiative the first time it was put up for decision. In the town of Friesack, located at the park's eastern edge, the proposal was initially voted against following heavy debates due to concerns about potential restrictions. A second vote, taken several months later and after further information had been provided, resulted in a majority decision (12:2:1) in support of the initiative (interview 8; Stadt Friesack, 2011).

adjoining municipalities, as these make changes to their street lighting (Hänel & Hesse, 2011, pp. 19, 21). While this application was rejected by the IDA, it recommended to pursue the establishment of a dual-zone Dark Sky Reserve rather than a Park (IDA, 2012). This suggestion was taken on and efforts were reinforced by all parties involved, resulting in a new application for designation as a Dark Sky Reserve. Submitted in late 2013, designation was granted in early 2014, thus making it the first dark sky area in Germany (IDA, 2014). A completely uninhabited and unlit core zone in the north-western part of the park is now surrounded by two buffer zones. The first surrounds the core completely and includes several villages, all of which have adopted lighting guidelines that apply to their public lighting. The second buffer encompasses the more distant areas of the park to the north-east and south. It thus also includes the two larger towns of Rathenow and Premnitz – remarkably, both of these towns' councils voted in favour of adopting the proposed lighting guidelines, as did the other smaller townships that took decisions¹² (Hänel et al., 2013).

4 Actors and their Interests

Across the three case studies, a total of 46 distinctive actors were identified and included in the analysis of interests. All of these are known by individual or organisational name and function. 17 of these actors were interviewed personally and could thus be analysed based on these interviews as well as on documents authored by the actors themselves and secondary information from interviews with other actors and from further documents; the remaining 29 were analysed based on documents authored by the actors themselves, as well as secondary information from the conducted interviews and from further documents.

The range of actors is broad and includes individuals with and without relevant organisational affiliations, NGOs, government bodies, politicians and business organisations. For the purpose of analysis, these actors were categorised according to whether they a) follow specific thematic orientations or b) fulfil a generic structural role. This resulted in three thematically related and two structurally related actor groups:

¹² When the application was submitted, the municipalities in the second buffer zone that were located furthest from the core had expressed their support but had not yet taken a vote (Hänel, Hesse, & Isermann, 2013, p. 49).

	Name of group	Types of actors included
<i>Thematically related actor groups</i>		
	The Astronomers	Actors who have a clear thematic orientation towards various forms of astronomy
	The Environmentalists	Actors who have a clear thematic orientation towards environmental protection
	The Heritage Preservationists	Actors who have a clear thematic orientation towards heritage preservation
<i>Structurally related actor groups</i>		
	The Politicians	Actors who are elected decision-makers
	The Businesspeople	Corporate actors and their interest organisations

Table 3: Actor groups: Overview; source: own illustration

The decisive aspect for the classification was each actor's main entry point to the endeavours for dark sky designation in the region. The result was cross-checked by examining whether basic patterns of interest could be identified within the groups that emerged, which was the case.

It is to be noted that a limited number of actors are included in more than one group. This is the case for some individuals – for example, a person who is an amateur astronomer as well as an activist for environmental conservation – and for a few organisations – for example, a heritage foundation that works toward the protection of both historical and environmental heritage. With one exception, the actors that straddle more than one group remain within the thematically related groups.

The following basic set of aspects was analysed and is described for each of the five actor groups:

- Composition of the group:
 - What types of actors does the group include for each of the case studies?*
 - Is the group fairly homogenous or are there relevant differentiations?*
- Basic attitude toward the dark sky designation:
 - Are the actors in favour of the designation or do they oppose it?*
 - If applicable: Which differentiations are to be made?*
- Main interests related to the dark sky designation:
 - Which core interests do all actors within the group share?*
 - Which additional interests are most pronounced in the actor group?*

4.1 The Astronomers

Astronomers, that is: actors with a clear orientation towards astronomy, are well represented in all three case studies. The group includes both professional and amateur astronomers. While some of the astronomers act as individuals, others act on behalf of astronomy-oriented organisations. Where the latter is the case, the actors are generally the heads of organisations or sub-groups which have taken on the issue of light pollution.

Most actors in the group approach astronomy through the lens of astrophysics. However, the group also includes a cultural humanities approach to the topic. What ultimately binds the two together is the need to be able to see the night sky with its celestial bodies in order for the actors to be able to fulfil their respective pursuits.

Against this background it is not surprising that all actors in this group strongly support the designation as a dark sky area. Several are among the initiating actors and driving forces of the processes: in each of the cases, there is at least one astronomy-oriented actor at the centre of the happenings.

The core interests of this actor group emerge clearly and revolve around the conservation of a “window” to the night sky – generally for observation, but in certain cases also for preserving opportunities for education and research. For some, this can mean the protection of an existing, albeit undeclared, observation site. For others, it can mean the salvation of one of a few remaining places and its instatement as a location for astronomical observation. In either case, the main aim is to preserve a place and thus an opportunity for an activity that is absolutely dependent on low levels of light pollution: observing the night sky. As one astronomer illustrates, this is particularly crucial for amateur astronomers (interview 9, author’s translation):

“Well, where should they [amateur astronomers] go to observe? Where can they go to observe? I mean, the professionals – they are long gone. They emigrated a long time ago.”

A very broadly shared interest is that in creating popular awareness for the protection of the night sky as well as the issue of light pollution and options for its abatement. Several different nuances can be identified with regard to this interest. The most pronounced is that the visibility of the night sky should be more broadly recognised as a thing of value and worthy of protection – be it within the region concerned or beyond. Substantial interest is also devoted to the possibility of using the designated area as a vehicle for raising awareness of light pollution, not only as a detriment to the visibility of the night sky, but also as a serious environmental threat and thus a necessary aspect of environmental protection more generally.

Linked to this, the designation of a dark sky area is seen by some as a supporting element toward the reduction of light pollution directly in the region concerned – be it through positive sensitisation of the population and thus broader political acceptance of measures or through measures directly linked to the designation, such as changes

to existing lighting. Finally, and particularly in the Westhavelland, this interest goes hand-in-hand with the prospect of setting an example for other towns and regions by demonstrating how lighting can be implemented that is sensitive to night sky and environmental issues without alienating the local population.

4.2 The Environmentalists

The environmentalists, that is: the actors with an environmental conservation focus, are well represented in all three case studies. A substantial portion of this group's actors are public administrations or institutions charged with the administration and development of natural resources and parks. The group also encompasses non-governmental organisations with an environmental focus (especially bird conservation), and private land trusts. Individuals are also well represented within the group. In some instances, the individuals do not only act on their own behalf, but also fulfil leading functions in regional organisations within which environmental conservation is only one of several topics.

The environmentalists express clear support of the designation – and several of them are among the central proponents of the idea. What makes the dark sky designation desirable for the environmentalists is that it basically adds an additional layer of protection, thus reinforcing and complementing existing mechanisms that are already in place to conserve an ecologically valuable area. In the environmentalists' perception, naturally dark nights are an integral part of an intact natural environment that is to be conserved, as are the plant and animal species whose habitat it is. The executive director of a private land trust illustrates the complementary nature of environmental and dark sky protection as follows:

“That was sort of a delightful surprise to us that sort of verified what we do in land conservation. That when we protect land in perpetuity, it's not just for the purposes that we're aware of now, but new things can come up. We didn't envision an International Dark Sky Park when we first did the project [protecting the Headlands], but the fact that the land was there and protected made that Dark Sky Park possible and so that to us sort of proves that we're on the right track in land conservation [...].”

A particular focus is added to this holistic core interest in two of the cases: The Headlands and the Westhavelland are both important staging areas for migrating birds. In line with this, some of the environmentalists place particular emphasis on their protection from the disorienting effect of artificial light at night.

The environmentalists' pronounced interests are anthropocentric in that they gravitate around conserving the night sky for the benefit of humans. Again, dark sky protection is clearly viewed as an integral part of a larger concept – in this case of upholding and strengthening the protected area's recreational qualities. The closely related nuances expressed by the various actors include that dark sky designation

supports the conservation of a place of calm and respite from current societal strains and the fast pace of life, of a place with a special atmosphere or a sense of remoteness and wilderness, and of a place in which it is still possible to experience both real darkness and a star-studded night sky. In some cases, this recreational focus also includes the preservation of opportunities for environmental education and awareness-raising, especially through experiencing nature at night.

These largely recreation-oriented interests go hand in hand with other pronounced interests that focus on the designation's potential contribution to the region's – particularly economic – development. Dark sky designation is seen as a chance to gain a unique selling point as compared to other eco-tourism destinations and for the park becoming more widely known through the publicity associated with the designation. Both are hoped to work as development impulses by resulting in higher visitation of the park and the region at large. These interests play a substantial role in the Headlands and the Westhavelland. In the latter case, increased external recognition and visitation are also understood by some as a means of strengthening the park's standing and/or the acceptance of environmental measures within the region itself, namely that conservation does not only mean restrictions but that it can also offer opportunities that are otherwise not to be had.

4.3 The Heritage Preservationists

Heritage preservationists, that is: actors largely oriented toward heritage preservation, are exclusively represented in the two North American case studies. A substantial portion of the actors among the heritage preservationists are locally rooted organisations explicitly geared toward historical awareness and preservation. Other actors included in this group have a wider overall profile, but nonetheless a pronounced heritage preservation focus, such as local homeowners' organisations or regional bands of Native Americans. Some of the individuals among the heritage preservationists are also active in local and larger-scale groups dealing with preservation issues to a greater or lesser extent.

A spectrum of foci can be identified among the heritage preservationists, ranging from historical to scenic to natural and cultural heritage preservation issues. These foci are not clearly bounded – on the contrary: they are closely intertwined. While the different actors do accentuate various subject matters, the intrinsic relations between these are often underlined by the actors themselves and result in substantial overlaps of interest.

The heritage preservationists are all strongly in favour of dark sky designation. What makes the designation especially appealing to this group is that dark sky protection is seen as a relevant, or even valuable, contribution toward their respective preservation efforts. Against the background of this fairly broad core interest, several thrusts of pronounced interests can be identified.

For many of the heritage preservationists, the visibility of a star-filled night sky is an integral part of what makes their region a special and beautiful place. Several actors place particular emphasis on the area's natural beauty in terms of its wilderness, an unpolluted night sky being an essential characteristic. Others focus more strongly on the effect that dark sky protection may have on the development of townscapes themselves, as the director of a homeowners' association explains (interview 1):

“So this issue, to me, it's always gone beyond just looking at stars. It's nice to do and cottagers, people having holiday, like to look at stars. But it's more fundamental than that. It's about resisting ugly urbanization. And if you can get a handle on the lighting, a lot else comes through.”

A related angle among the heritage preservationists is the relevance of protecting dark nights as part of protecting an intact historical setting, thus preserving a place or area where it is not only possible to view historical buildings or an intact natural environment during the day, but also to see and experience what it must have been like at night-time before the advent of large-scale artificial lighting. Overall, protecting an area from light pollution thus becomes one element toward securing and developing a region's scenic and aesthetic qualities at large, both for its inhabitants as well as for visitors.

Finally, in a view that is particularly developed among heritage preservationists in the Headlands, dark sky protection fulfils an important role in the preservation and development of cultural assets. In the broadest understanding, the experience of the night sky is, in itself, part of the region's as well as humanity's cultural heritage. More specifically, having an undiluted view of the starry sky, but also having the possibility to experience real darkness, is considered a prerequisite for certain forms of cultural education and thus personal as well as societal development. On the one hand, the visibility of the stars and planets is seen to be essential for the preservation and 'keeping alive' of cultural knowledge rooted in the night sky and its constellations – ranging from ancient mythology to Native American star stories. On the other hand, the night sky is considered an irreplaceable source for cultivating human imagination and inspiration.

4.4 The Politicians

Politicians, that is: elected decision makers at local and regional level, are relevant to all three case studies. Among the politicians, members of local municipal governments and parliaments – in particular mayors, township directors and municipal councils – form the largest group. Furthermore, representatives at two different regional levels, namely county commissioners and a state parliamentary representative, are included for the Headlands.

Given that binding regulations – which often require political decisions – are essential for an area to qualify for dark sky designation, politicians play a pivotal role in the

process running up to the application. As all three case studies are either designated dark sky areas, it is not surprising that most of the politicians are in favor of dark sky designation. This actor group's central commonality when it comes to speaking out for or against dark sky protection is the relevance attributed to public opinion – and the interest of acting in its favour.

The politicians' core interests in gaining dark sky designation revolve around two interrelated prospects: On the one hand, it is seen as a means of increasing publicity for their town or region. On the other hand, there is the hope that it will strengthen their town or region's development, particularly in economic terms. The anticipated publicity associated with a designation that is still fairly rare and bears the hallmark of being 'national' or even 'international' is seen as an opportunity for making the region more widely known: For many, the designation holds the promise of becoming a unique selling point. The resulting increased public awareness is, in turn, seen as a way of boosting tourism to the region, which holds the prospect of acting as a stimulus for broader economic development. Beyond the interest in simply attracting more visitors, which is shared across the board, the politicians are often also interested in receiving the designation as a stepping stone toward developing a special niche in the market and attracting visitors during times of the year that have, so far, been off-season.

An interest that is shared by a large portion of the politicians is that of protecting something the region still has, but that is becoming increasingly rare. This pronounced interest has several nuances. These particularly include a holistic approach to protecting the region's natural environment (i.e. also keeping an intact night-time environment) and recognising the dark sky as a resource that is of value in itself, and that is likely to become more sought-after with increased rarity.

The following quote from an elected director of a township consisting of several villages well exemplifies the range of prominent interests (interview 6, author's translation):

"First of all, it's important to be doing something for the environment, for our children and grandchildren – conserving a piece of nature. To me, that is the heading for it all. The second aspect is, of course, what we're telling the people here: 'You still have this unique feature – preserve it, and you will profit in addition, because it is also an attraction.' [...] And then there is also the economic effect, which is important for the towns, especially as we are in a structurally weak area, that it is possible to combine two things: We have done something for the environment – and we're profiting from it. Possibly. But at least the prospect is there [...]"

Whether the political actors decide to speak out for or against dark sky designation is intrinsically connected to their evaluation of the potential costs versus the potential benefits. While initial reservations are not uncommon, most end up supporting the endeavour upon closer inspection, because it promises potential benefits such as

increased recognition and tourism, but seems neither to imply large-scale public investments nor far-reaching restrictions and – very importantly – does not meet (substantial) opposition from their electorate.

In the cases in which (initial) doubt or – rarely – even opposition to the idea is reported, it has to do with exactly these three potential cost factors. Given the tight public budgets, the politicians are generally averse to committing to additional expenditure – insecurity as to whether the designation may entail financial investments and/or as to whether these would really pay off is one reason for occasional scepticism. Furthermore, there is a fairly widespread reluctance among the politicians to add any further rules or restrictions whatsoever to a framework that is frequently already perceived as over-regulated. Thus, qualms arise with those who deem that the regulations necessary for reaching dark sky designation may go too far beyond simply putting in writing what is already being practiced anyway, be it by placing too tight a harness on future decisions (e.g. concerning whether or what types of streetlights can be installed) and/or by impacting popular (and potentially also economically lucrative) activities such as hunting or snowmobiling – both topics that are reported to have been brought up at public events. The structural difference between Torrance Barrens and the Headlands as unpopulated areas on the one hand, and the Westhavelland as an area including municipalities on the other hand, is reflected in the politicians' doubts about the designation: while concerns about restrictions of leisure activities are a topic in the former, it is particularly questions of costs and restrictions concerning public lighting as well as fears of restrictions to private lighting that play a role in the latter.

Ultimately, initial or maintained reservations and occasional opposition among politicians or their electorate has not been substantial enough in any of the three case studies to endanger the political support necessary for dark sky designation: All politicians in leading positions (mayors, township directors, county commissioners) spoke out in favour of the designation and decisions by local councils were generally taken unanimously or with few abstentions or votes against.

4.5 The Business People

The business people, that is: entrepreneurs and corporate actors, are relevant to the Headlands as well as the Westhavelland. This group is largely composed of organisations representing actors with a business interest, such as local or regional chambers of commerce or tourism associations with a largely commercial membership and orientation. It also comprises individual service providers (guest house, tour guide) that have been active in relation to dark sky designation. It is relevant to note that many of the businesses that voiced their opinion on the designation are directly or indirectly dependent on the region's intact natural environment, and that some actors in this group clearly state that supporting environmental education and protection is part of their pursuit.

All of the businesspeople express clear support of gaining dark sky designation. Similar to the politicians, the business people's core interests are oriented toward the region becoming more widely known and, in connection with this, benefitting from the designation economically, especially through increased tourism. As the President of a regional chamber of commerce puts it (Smith, 2011):

"The prestige and credibility that comes with the Dark Sky Designation would enhance the attractiveness of the Headlands property. This could potentially bring more guests to our region. Eco-tourism is one of the foundations of our local economy and we see the Dark Sky Designation as another valuable tool for eco-tourism promotion."

Gaining dark sky designation is generally considered an additional means of strengthening efforts of the business community that are already on-going. On the one hand, the businesspeople welcome the possibility to market their region as a dark sky destination, as it provides an opportunity to sharpen their region's profile in public perception and set it apart from others. On the other hand, the designation is also perceived as an incentive and opportunity to further develop and fill a market niche, especially by offering services geared toward visitors that come to observe the night sky or the natural environment at night. Examples are additional recreational and educational tours, or the option of late breakfasts and rooms with shutters on the windows that allow for sleeping in after a long night out.

Beyond these clear core interests, there are few pronounced interests among the businesspeople. One identifiable thrust is that dark sky designation is welcomed as a further supporting element toward conservation of the region's intact environment, which is valued not only as a feature that distinguishes the area from others, but also in itself.

5 Overarching observations

The analysis outlined here demonstrates that there is not only a broad array of actors involved in the work leading up to dark sky designation, but that these actors come with a remarkably broad set of interests – and a remarkably broad range of agreement.

Given the wide range of actors involved, it may seem surprising that no substantive opposition or clashes of interest came about in any of the three cases. And yet, reaching beyond the case-studies underpinning this research and the interviews conducted in their framework, also written material – from secondary literature to policy documents to media reports – provides additional evidence that work towards dark sky designation is currently largely unconflictual. What carries the initiatives is that all identified actors see pre-existing interests of theirs matched by potential benefits resulting from the designation. Though their interests are diverse, they do

not infringe upon each other: they align, overlap or complement each other, thereby creating win-win-situations.

The vast majority of dark sky designations feature a dual nature that is elementary for garnering such widespread support: They are not only a regulatory framework for mitigating light pollution, but also a form of promotionally effective certification or labelling. This dual nature is reflected in the actor groups' main interests (see table 4). These generally feature a combination of interests linked directly to the mitigation of light pollution itself and of interests in effects the certification may have. Nonetheless, somewhat diverging centres of gravity can be discerned: While the thematically related actor groups tend to place more emphasis on the designation as a tool for the preservation of darkness, the structurally related actor groups lean more toward its contribution to increased publicity and visitation.

It furthermore becomes clear that one and the same aspect addresses different interests of different actors. This becomes particularly apparent when contrasting the thematic actor groups' (core) interests, which revolve around the principal aim of dark sky designations: keeping the area free of light pollution. For the astronomers, this means securing a place to observe the night sky; for the environmentalists, it means protecting the night-time environment; for the heritage preservationists, it means conserving scenic qualities and cultural assets.

Similarly, the politicians' and business people's manifest interest in promotional effects is shared by other actors for a number of different reasons. Gaining public attention is, for example, a core interest for politicians and businesspeople, especially because it promises to attract visitors and have positive effects on the local economy. Many environmentalists share this interest in publicity, especially park administrations hoping to increase their visitation. To the astronomers it is of interest because it is a way to raise awareness for light pollution as a problematic phenomenon.

Interestingly, the typical ecotourism challenge posed by the contradictory aims of environmental protection and increased visitation did not play a major role in any of the three cases. Where such concerns were considered, they were resolved in the process – generally by plans for visitor guidance.

Main Interests ★ Core Interest // ◎ Pronounced Interest	Actor Groups				
	The Astronomers	The Environmentalists	The Heritage Preservationists	The Politicians	The Business People
Conserving a window to the night sky	★		◎		
Raising awareness for light pollution as a problem	◎				
Reducing light pollution locally	◎				
Protecting the night-time environment		★		◎	◎
Increasing awareness for the park or region		◎		★	★
Supporting regional economic development		◎		★	★
Developing recreational qualities		◎			
Preserving scenic/aesthetic qualities			◎		
Protecting a historical setting			◎		

Table 4: Overview: Actor groups and their main interests; source: own illustration

6 Conclusions

The designation of dark sky areas is, by design and default, dependent on the support of a multitude of stakeholders at local and regional levels. The analysis presented here demonstrates that its implementation has, so far, been a largely harmonious matter and that it is an instrument that has gained widespread support in the contexts in which it was applied: Different actors identify a variety of benefits associated with the effects of mitigating light pollution on the one hand, and acquiring a novel type of certification on the other.

As a young policy instrument, dark sky designation is not cast in stone – on the contrary: it is very much in motion and has undergone a considerable process of evolution. The instrument is spreading geographically from North America to Europe – and thus from a continent that features large unpopulated tracts of land to one in which human settlements intersperse even areas remote from urban centres. Hand in hand with this development, weight is shifting between conceptual approaches. Dark Sky Parks are geared toward keeping light pollution at bay in dark, unpopulated and protected areas that are publicly owned. The concept of Dark Sky Reserves, and, similarly, Dark-Sky Preserves, strives to address situations that are more

complex and challenging, marked by an inclusion of lit areas and more fragmented governance structures.

As the instrument moves to more populated areas, its implementation becomes a more decidedly political matter: It is no longer a question of one or two governing bodies taking decisions about uninhabited territory, but of municipalities integrating and mainstreaming light pollution policies into their regulatory systems and planning practices. Moreover, as the dark sky designations are applied to areas with more, and more diverse forms, of lighting, they will be moving closer to more urban perceptions of light and darkness (see Besecke & Hänsch 2015). This is likely to imply larger frictions and command a need for more intense negotiation on the values of artificial illumination and dark nights.

At the same time, the continued development of areas that have been designated should be further researched: How effective is the instrument as a means of light pollution abatement? Is the broad support of actors in gaining designation reflected in the way that lighting guidelines are interpreted, applied and developed once designation has been gained? Do conflicts arise – and do the competing aims of protecting the environment and increasing visitation remain unconflictual?

After all, dark sky designation is applied to areas in which the vast majority of stakeholders agrees that dark skies are worthy of protection. As reaching dark sky designation is a largely bottom-up effort, the rapid growth in the number of designated areas points to a revaluation of naturally dark nights and, particularly, the visibility of the night sky: As dark skies are becoming increasingly rare, many actors are discovering them as a resource – one of multiple applicability, and one that serves purposes reaching beyond astronomy to include aspects such as environmental protection, cultural and regional development.

7 Sources

7.1 Interviews

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- Interview 2: Engineer and head of a light pollution abatement committee at national level, March 14, 2013.
- Interview 3: Recreational astronomer, naturalist and initiator of a dark sky area, March 13, 2013.
- Interview 4: Star lore historian and initiator of a dark sky area, March 11, 2013.
- Interview 5: Executive Director of a regional private land trust and initiator of a dark sky area, March 11, 2013.
- Interview 6: Elected director of a township consisting of several villages, October 25, 2012.
- Interview 7: Director of a nature protection area, October 15, 2012.
- Interview 8: Elected director of a township consisting of several villages, February 13, 2013.
- Interview 9: Astronomer, head of a light pollution abatement committee at national level and initiator of a dark sky area, September 21, 2012.

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